

REMARKS

In view of the above amendments and the following remarks, reconsideration of the rejections contained in the Office Action of January 9, 2006 is respectfully requested.

By this Amendment, claims 1-6 have been amended and are currently pending in the application. No new matter has been added by these amendments.

In order to make editorial improvements, revisions have been made to the specification. No new matter has been added by the revisions. Entry of the amendments to the specification is thus respectfully requested.

On pages 2-4 of the Office Action, claims 1-6 were rejected under 35 U.S.C. § 102(b) as being anticipated by Janos et al. (US 5,966, 981). For the reasons discussed below, it is respectfully submitted that claims 1-6, as amended, are clearly patentable over the prior art of record.

The present invention is directed to a die cushion apparatus of a press machine which, as recited in amended independent claim 1, comprises a die cushion pad, a first pressure receiving unit for containing pressure oil and a second pressure receiving unit for containing sealed gas. The die cushion pad and first and second pressure receiving units are arranged such that when the pressure oil is pressurized by a pressurizing force acting upon the die cushion pad, the sealed gas is compressed only by pressure of the pressurized pressure oil.

Independent claim 2, as amended, recites a die cushion apparatus comprising a die cushion pad 2 which is movable up and down according to a pressurizing force externally applied to the die cushion pad 2. The die cushion apparatus also comprises a first pressure receiving unit which includes a first accommodation unit 51, a first sliding member 52 and a first hydraulic chamber 53. The first sliding member 52 is slidably received in the first accommodation unit 51 so as to define the first hydraulic chamber 53, and the first sliding member 52 is caused to slide by a pressurizing force acting upon the die cushion pad 2 to thereby pressurize pressure oil in the first hydraulic chamber 53. The die cushion apparatus also comprises a second pressure receiving unit which includes a second accommodation unit 61, a second sliding member 62, a second hydraulic chamber 63 and a gas pressure chamber 64. The second sliding member 62 is disposed between the second hydraulic chamber 63 and the gas pressure chamber 64 and only oil pressure and gas pressure act on the second sliding member 62. Additionally, the second sliding

member 62 is slidably received in the second accommodation unit 61 so as to define the second hydraulic chamber 63 and the gas pressure chamber 64, and the second sliding member 62 is caused to slide by a pressure of the first hydraulic chamber 51 to thereby compress gas in the gas pressure chamber 64.

Independent claim 3, as amended, recites a die cushion apparatus comprising a die cushion pad, a first pressure receiving unit and a second pressure receiving unit, all of which have the same features as the die cushion pad, first pressure receiving unit and second pressure receiving unit discussed above with respect to amended independent claim 2. The die cushion apparatus further comprises a hydraulic pump 3 that supplies pressure oil to the first hydraulic chamber 53. The die cushion apparatus also comprises a first check valve 8 that prevents a flow of the pressure oil from the first hydraulic chamber 53 to the hydraulic pump 3, and a second check valve 9 that prevents a flow of the pressure oil from the second hydraulic chamber 63 to the first hydraulic chamber 53. The die cushion apparatus also comprises an opening/closing unit that closes the flow of the pressure oil from the second hydraulic chamber 63 to a hydraulic tank 11 when the second sliding member 62 slides in the direction of compressing the gas in the gas pressure chamber 64, and opens the flow of the pressure oil from the second hydraulic chamber 63 to the hydraulic tank 11 when the second sliding member 62 slides in the direction of compressing the pressure oil of the second hydraulic chamber 63.

Independent claim 6, as amended, recites a method of reducing a surge pressure generated in a die cushion apparatus of a press machine. The method comprises applying a pressurizing force to act upon a die cushion pad of the die cushion apparatus to thereby pressurize pressure oil, and pressurizing a gas by applying only a pressure of the pressurized pressure oil to the gas.

Janos discloses a press assembly which, as shown in figures 6-9, includes an upper draw ring 24a and a lower draw ring 26a used to deform a sheet metal work piece 28a. The press assembly also includes a pump cylinder assembly 102 which contains hydraulic fluid received from a reservoir 64a. The press assembly also includes a piston and cylinder assembly 40a, in which a piston 44a divides the cylinder 42a into upper and lower variable volume chambers 46a and 48a. The upper variable volume chamber 46a contains hydraulic fluid and the lower variable volume chamber 48a contains a gas.

During operation of the press assembly, as show in figures 6-7, the upper draw ring 24a is

moved downward and a projection 104 engages the piston 106 of the pump cylinder assembly 102. The projection 104 presses the piston 106 downward to thereby force hydraulic fluid from the lower variable volume chamber 110 through a check valve 74a and into the upper variable volume chamber 46a of the piston cylinder assembly 40a. As hydraulic fluid is supplied to the upper variable volume chamber 46a, piston 44a is moved downward which causes the gas contained in the lower variable volume chamber 48a to be discharged to a high pressure reservoir 58a.

However, Janos does not disclose a die cushion apparatus in which the die cushion pad, the first pressure receiving unit and the second pressure receiving unit are arranged such that the sealed gas is compressed only by pressure of the pressurized pressure oil, as recited in amended independent claim 1. Rather, as shown in figure 7 and explained in column 7, lines 43-48, Janos discloses the piston 44a being moved downward to compress the gas due to the combination of the hydraulic fluid being introduced into the upper variable volume chamber 46a and the lower draw ring 26a being pressed downward against the piston 44a. Therefore, Janos does not disclose the sealed gas being compressed only by pressure of the pressurized pressure oil (hydraulic fluid) because the sealed gas in Janos is compressed by the pressurized hydraulic fluid and the pressing force of the lower draw ring 26a. Accordingly, it is respectfully submitted that Janos does not anticipate amended independent claim 1.

Similarly, Janos also does not disclose a second pressure receiving unit in which only oil pressure and gas pressure act on the second sliding member, as recited in amended independent claims 2 and 3. As discussed above, the pressure of the hydraulic fluid in the upper variable volume chamber 46a and the pressure of the gas in the lower variable volume chamber 48a are not the only forces acting on the piston 44a, because Janos discloses that the pressing force of the lower draw ring 26a also acts on the piston 44a. Therefore, Janos also does not anticipate amended independent claims 2 and 3.

In addition, with respect to amended independent claim 3, Janos also does not disclose a first check valve that prevents a flow of the pressure oil from the first hydraulic chamber to the hydraulic pump. Rather, as explained in column 7, lines 14-16, the check valve 120 prevents a flow of the hydraulic fluid from the pump cylinder assembly 102 to the low pressure reservoir 64a. Therefore, Janos does not disclose a first check valve that prevents a flow of the pressure

oil from the first hydraulic chamber to the hydraulic pump.

Janos also does not disclose a method of reducing surge pressure in a die cushion apparatus that includes the step of pressurizing a gas by applying only a pressure of the pressurized pressure oil to the gas, as recited amended independent claim 6. As discussed above, Janos discloses the gas in the lower variable volume chamber 48a being compressed by the pressurized hydraulic fluid in the upper variable volume chamber 46a and the pressing force of the lower draw ring 26a acting on the piston 44a. Therefore, Janos does not disclose a method of reducing surge pressure which includes a step of pressurizing a gas by applying only a pressure of the pressurized pressure oil to the gas. Accordingly, Janos does not anticipate amended independent claim 6.

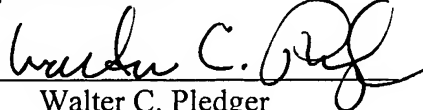
Therefore, it is respectfully submitted that independent claims 1-3 and 6, as well as claims 4 and 5 which depend therefrom, are clearly allowable over the prior art of record.

In view of the foregoing amendments and remarks, it is respectfully submitted that the present application is clearly in condition for allowance. An early notice to that effect is respectfully solicited.

If, after reviewing this Amendment, the Examiner feels there are any issues remaining which must be resolved before the application can be passed to issue, the Examiner is respectfully requested to contact the undersigned by telephone in order to resolve such issues.

Respectfully submitted,

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